Welcome to AntennaSelect™ Volume 42 – February 2019

Welcome to Volume 42 of our newsletter, AntennaSelect™. Every two months we will be giving you an "under the radome" look at antenna and RF Technology. If there are subjects you would like to see covered, please let us know what you would like to see by emailing us at: info@micronetixx.com

In this issue:

Interim/Rental Repack Antennas – Low Cost Ideas

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We have had some inquiries about the availability of rental TV and FM antennas for the Repack. Doing the math, a rental antenna used over a short term period would cost more than an outright purchase. With a fairly short Repack period, it would be difficult to calculate the costs of a rental antenna. And if a problem came up that required the antenna to remain on-site for a longer period of time, the scheduling process goes out the window. Then there are the costs of sending the antenna back to us. That can easily run several thousand dollars and even more if the crates that housed the antenna are damaged. Taking all this into consideration, we decided that we would not be renting antennas. There are several other low-cost solutions.

We have seen, on numerous FCC form 399 filings, very high costs for interim antennas from some of our competitors. We have some much better solutions, that cost quite a bit less and will not load up the tower as much. Let's run a few examples first of a UHF side mount antenna, then a high band VHF antenna.

UHF Slot Antenna

So let's look at a basic side-mount slot antenna. It can be a single or dual channel model. How much Effective Radiated Power, (ERP), can we get from this approach, and what are the limitations? The ERP limitations come from two specifications; The input connector size of the antenna and the type of transmission line used. Let us do some calculations for a channel 30 project. We will use an 8 bay Omnioid Slot Antenna, mounted at 500 feet on the tower. Our lowest power standard slot antenna has a 3-1/8" EIA input. The maximum input power we recommend is 12.5 kW.

With a 50 foot horizontal run of cable, the total length is 550 feet. We will run the maximum ERP with some popular transmission line types:

1-5/8" foam flex – maximum ERP is 29 kW with a 3.97 kW TPO
1-5/8' air flex – maximum ERP is 42 kW with a 5.83 kW TPO
3" air flex – maximum ERP is 115 kW with a 13.69 kW TPO
3-1/8" EIA – maximum ERP is 165 kW with a 15.85 kW TPO

So what is the best value here?. Assuming flat terrain, the line-of-site at 500 feet is about 27-1/2 miles. Using the 1-5/8" foam line, the ERP is almost double that of a Class A station, and the 1-5/8" line yields almost 3 times the ERP (15 kW vs. 42 kW).

What if you needed a higher ERP? We can build that same Omnioid antenna with a 4-1/6" EIA Input. The input power rating is then 25 kW. In that configuration, the maximum ERP would be 355 kW, with the assumption that the antenna is fed with a 4-1/16" EIA line.

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So what if we needed a higher ERP? Our side-mounted UHF slot antennas are built in two-bay increments. So let's take a look at a 10-bay antenna, with a 4-1/16" EIA input. The maximum ERP goes up to 440 kW, using the same TPO as in the 8 bay configuration.

The difference in tower loading between the two antennas (8 bay versus 10 bay) is 65 more pounds and just 6 square feet of additional wind load area. The 10 bay antenna is 6 feet longer. What is the difference in cost? The 10 bay antenna is about $4,000 more than the 8 bay model.

Let's run one more calculation, this time using a 12 bay antenna with the same 4-1/16" EIA input. The maximum ERP goes up to 530 kW. This antenna is just under 4 feet longer (26-1/2 feet), has a 30 lb higher weight and 4 square feet of higher wind load area. The difference in cost between the 10 bay and 12 bay antenna is $3500.

Of course we can provide directional azimuth patterns, and elliptical/circular polarization when desired/needed.

VHF High Band Antennas

At high band VHF we are at about 1/3rd the frequency of a UHF channel. The size of the antenna increases by a factor of about 3 too because of the lower frequency. We have two excellent solutions for side mount antennas. One is a slot design, the other is an inverted dual VEE. At high band VHF, the antennas normally built are under 6 full-wave spacings for a side-mount antenna, and 12 bays for a top-mount model. Using channel 10 as an example, a wavelength is 60.52 inches – so each additional bay would be that much longer. For an interim or side mount standby antenna, our most popular bay-counts are 3 or 4. With the Omnioid pattern, that translates to a gain of 5.1 to 6.8. On our slotted antennas we use a 3-1/8" EIA Input.

So a 4-bay antenna fed with 3" flex line, (again 550 feet), could produce an ERP of 230 kW. Dropping down to a 1-5/8" low loss foam line would still produce a 56 kW ERP.

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We can also provide a low RFR version of VHF slot antenna, using our exclusive **SFN**™ technology. This approach uses half wave spaced slots. There are two benefits. First there is 15 to 20 dB less RFR being transmitted at high depression angles (the ground or building roof top). The second is a higher elevation gain. For a 3 bay standard slot antenna, the peak gain is 5.10, with an SFN antenna the gain increases to 6.46 from 5.10. With the 4 bay antenna, the gain increases to 8.16 from 6.80. We sell many more of the 3 bay **SFN** antennas, than the 4 bay. And yes, we can do either Circular or Elliptical polarization with these antennas. Mechanically the slotted antennas also need a larger pylon diameter than their UHF cousins. A UHF lower power pylon antenna usually uses a 3 to 3.5 inch diameter tube. For VHF, the diameter needs to be about 3 times as large for an Omnioid or Cardioid antenna. Non directional patterns (true Omni-Directional) need to be 16 to 18 inches in diameter. We use heavy wall passivated Aluminum material for the pylon and azimuth forming wings on side mounted models. This is much more cost effective than supplying a heavy and costly steel pylon system.

Another VHF high band antenna, is our **THV** series. This antenna uses a dual VEE design, similar to its FM cousin. This antenna is constructed from rugged 304L stainless steel. The **THV** is a circular polarized design, with an Omni-directional pattern. The bays are fed by an input power divider. Each bay is rated at a 2.5 kW input. So a 6 bay antenna would have a gain (C/P) of 2.65, and a maximum ERP rating of 15 kW. The 8 bay antenna has a gain of 3.50, and produce a maximum ERP of 20 kW, while the 10 bay antenna has a gain of 4.4, and maximum ERP of 25 kW. A 10 bay model weighs under 100 lbs, and has less than a 10 square foot load area. Cost ? A 10 bay model is under $31,000.00. If you are going to run a VHF interim facility, having C/P while at a lower power will greatly increase reception as compared to an H-Pol signal.

Adding Elliptical Polarization to a UHF Slot Antenna

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The FCC rulemaking for how to get reimbursements for changing out LPTV, and Translator stations looks to be ready in a few months. A number of our customers have been asking “how much does adding Elliptical Polarization affect the cost of the antenna”? Will the FCC allow stations to upgrade from horizontal to Elliptical Polarization and get the costs covered? Most likely not.

So let’s see what goes into producing an Elliptically Polarized, (E/P), antenna. To add E/P sets of elements, (we call them “Polarizers”), are mounted externally to the antenna pylon over the slot at DC Ground. They extract energy from the pylon and launch an in phase-quadrature signal.

So an 8 bay antenna would have 16 Polarizer elements. These are small stainless steel elements. When looking at one of our antennas you will not see these Polarizer elements. They are under the radome, protected from the elements. Some of our competitors mount their polarizers outside the radome. If one of these competitors offers you an antenna with an external polarizer, RUN! …Even light frost or ice can de-tune the antenna causing an unstable elevation pattern.

So what does adding E/P, or C/P do to the length, weight or wind load area of the antenna? Very little. The length and wind load area are identical. The weight does go up very slightly with the added Polarizers. For the 8 bay antenna, it’s about 16 pounds.

Is there any difference in cost between the amount of Elliptical Polarization used? No. The amount of vertical component is changed by how hard we drive the polarizers.

Finally the bottom line; How much more does it cost to add E/P to the 8-bay slot antenna? About $2500. For a 16-bay antenna, about $5000. Ask us for a quote; -you will be pleasantly surprised!

Flex Versus Hard Line Feeders for FM Antennas

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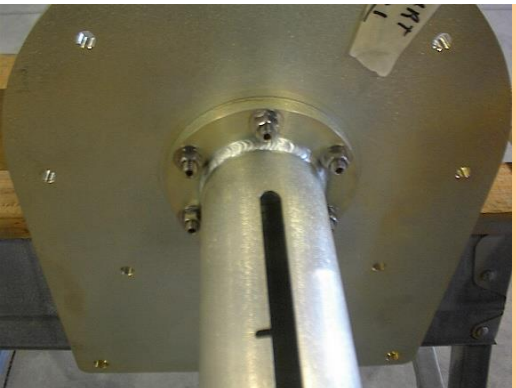
Flex versus hard line feeders for FM antennas? Yes we supply both. For lower power FM stations, or stations that have a self supporting tower, a flex feeder is a great option. We supply add an input power splitter and properly rated flex lines to each bay. From an installation standpoint, the flex feeder system is quicker to install and has much less in the way of hardware and pressure seals to deal with. In a hard line fed antenna, to get beam tilt and null fill, the top several bays of the antenna must be short-spaced. So the hard line between the bays needs to be custom manufactured. With a flex feeder system, all bays are spaced the same distance apart. The feeders to the top bays are cut shorter to produce the needed beam tilt.

If you have a self supporting tower in a very windy area, the top 60 feet or so of the tower can sway back and forth slightly. A 6 bay antenna has a length of about 60 feet. That sway can stress a hard line feed system by applying vertical forces upward and downward. Over time that can cause the feed line to degrade. A small crack will then loose pressure.

A number of you will be needing an interim FM antenna system for the Repack. We would love to design a system for you!

Be on the lookout for the next volume of AntennaSelect™ coming out in April



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